भारतीय मानक
Indian Standard

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पाइल बोरिंग उपकरण — सामान्य अपेक्षाएँ

(पहला पुनरीक्षण)

Pile Boring Equipment — General Requirements

(First Revision)

ICS 93.020

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July 2023 **Price Group 5**

Construction Plant and Machinery Sectional Committee, MED 18

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on the recommendation of the Construction Plant and Machinery Sectional Committee and approved by the Mechanical Engineering Divisional Council.

This standard was first published in 1996. This standard is being revised again to keep pace with the latest technological developments and international practices. In this revision, the standard has been brought into the latest style and format of Indian Standards, and references of Indian Standards, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act,* 2016.

The construction of bored piles requires careful selection of the boring equipment. The choice of the appropriate piling equipment will depend upon the subsoil conditions, diameter of the piles to be constructed, their depths, and other specific requirements of a particular project.

In view of the increasing usage of bored piles for various applications and also with the proliferation of the associated equipment, it has been considered necessary to lay down standard general requirements for pile boring equipment. However, it shall be noted that the equipments described in this standard refer to construction of bored piles on land only and without the use of bentonite.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PILE BORING EQUIPMENT — GENERAL REQUIREMENTS

(First Revision)

1 SCOPE

This Indian Standard lays down the requirements for sizes and dimensions of pile-boring equipment to be used for different soil layers.

2 REFERENCES

The standard listed below contains provisions which through their reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibilities of applying the most recent editions of the standard listed below:

IS No.	*Title*
IS 800 : 2007	General construction in steel — Code of practice (*third revision*)

3 MATERIALS

All materials used in the construction of pile-boring equipment shall conform to the requirements of relevant Indian Standards.

4 PILE BORING EQUIPMENT

4.1 General

The various items comprising pile-boring equipment are:

a) Winch;
b) Derrick;
c) Boring/chiselling tools;
d) Temporary casings;
e) Tremie arrangements; and
f) Accessories.

4.1.1 A typical piling winch shall consist of the following components (*see* Fig. 1):

a) Winch drum;
b) Prime mover;
c) Transmission system;
d) Clutch system;
e) Brake system; and
f) Winch frame.

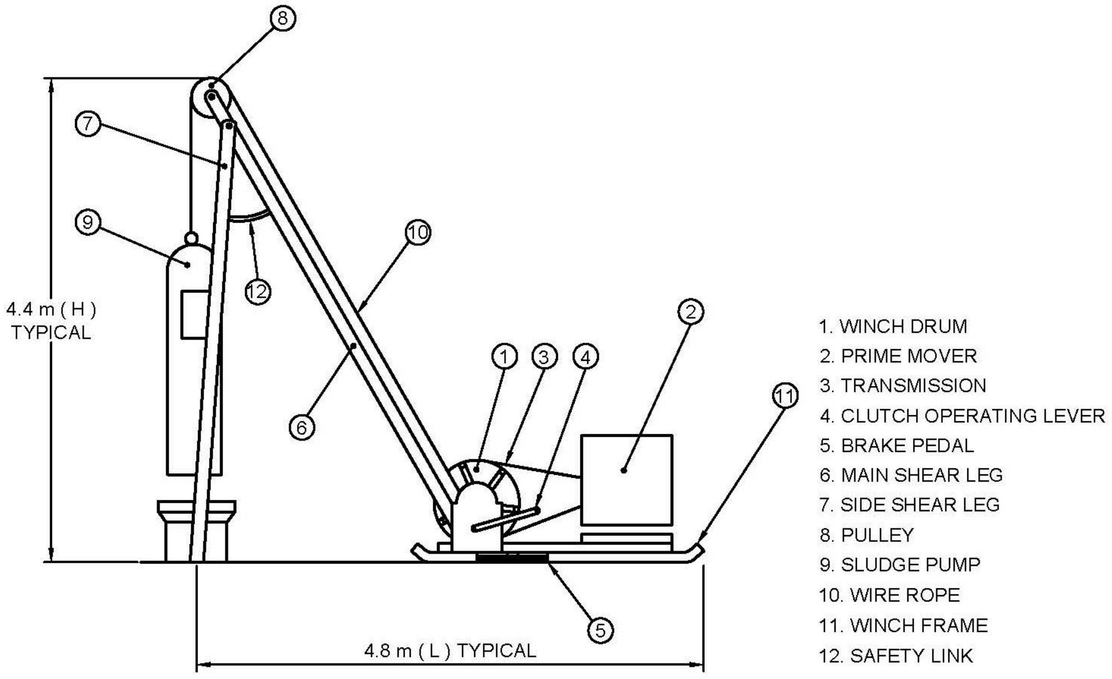

FIG. 1 WINCH AND DERRICK

4.1.1.1 *Winch drum*

The standard capacities (drum rope pull) of the winch drum shall be 1.5 t, 2.5 t and 5 t; and the drum diameter shall be not less than 20 times the diameter of the wire rope used.

4.1.1.2 *Prime mover*

The prime mover shall usually be a diesel engine of the air cooled type or an electric motor. A suitable reduction gear shall also be provided.

4.1.1.3 *Transmission*

The transmission system shall be one of the following:

a) Geared drive;
b) Chain drive; and
c) Belt drive (flat belt or V-belt).

The transmission system shall be provided with suitable guard cover.

4.1.1.4 *Clutch system*

The clutch system shall consist of a clutch wheel and friction plate(s) or a friction cone operated by a lever.

4.1.1.5 *Brake system*

This shall consist of a brake band connected with the foot brake pedal or brake handle for hand operation.

4.1.1.6 *Winch frame*

A typical winch frame shall be made from structural steel section and shall be either truck-mounted, crawler-mounted, or skid-mounted. A proper stabilizer shall be provided to transmit the load to the ground smoothly.

4.2 Derrick

4.2.1 *General*

The standard derrick shall consist of the following components:

a) Main shear leg;
b) Side shear leg;
c) Shear leg base;
d) Pulley; and
e) Safety link.

The hoisting capacity of the derrick shall be at least equal to the maximum drum rope pull and preferably more by 25 percent.

4.2.1.1 *Main shear leg*

The main shear leg shall be a box section fabricated according to IS 800 either from two mild steel angle sections or two channel sections. The box section shall have minimum dimensions of 125 mm^2 and the minimum length of the leg shall be 5.6 m.

4.2.1.2 *Side shear legs*

The two side shear legs shall have a minimum box section of 100 mm^2. One of the two side legs shall be provided with suitable mild steel rungs spaced 0.3 m apart up to the top. These legs shall be placed apart at a distance of minimum of 3 m.

4.2.1.3 *Shear leg base*

This shall consist of a steel plate welded to the base of the leg. Additional plates shall be welded on all four sides of the leg for up to 15 mm above the bottom of the leg.

4.2.1.4 *Pulley*

The pulley shall be usually provided at the top of the main shear-leg and it shall have a diameter at least 20 times the diameter of the wire-rope used. The pulley shall have a suitable guard and shall be properly lubricated.

4.2.1.5 *Safety link*

An interconnected steel-chain shall be provided near the top of the derrick so as to preclude any accidental increase in the distance between the legs.

4.3 Boring/Chiselling Tools

4.3.1 The various tools shall be as follows:

a) Sludge pump;
b) Bailers;
c) Chisels;
d) Casings;
e) Casing extractor plate;
f) Casing extractor bar;
g) Casing drive bar; and
h) Tiller.

4.3.1.1 *Sludge pump*

Boring shall be usually advanced by using a sludge pump (also called shell) as shown in Fig. 2. Weight of the sludge pump shall vary with the diameter but normally minimum weight shall be 7.5 kN. Sludge pump is a hollow cylindrical steel body with a cutting shoe at the bottom and a lifting hook at its top. It has hinged trap door immediately above the bottom cutting edge and it has an opening (window) near the top for muck removal. Above this window, lead or steel or concrete may be added to increase the weight of the sludge pump for effective boring.

4.3.1.2 *Bailer*

The bailer (*see* Fig. 3) is used for removal of water or slush from the bore hole. It is made up of a hollow steel cylinder with a lifting hook at the top and a truncated base plate with perforation at the bottom. There is a plunger passing through a central hole of the base plate which acts as a plug valve. This plunger is about 20 cm long and has about 15 cm diameter steel plates welded at its top and bottom. This closes the central hole in the base plate of the plunger and thus retain the slush material for removal.

4.3.1.3 *Chisels*

Hard strata during boring shall be broken by chisels. The chisels shall be made of solid round bar with a hard faced edge at the bottom (*see* Fig. 4). The chisel shall weigh at least 7.5 kN for 450 mm, 12.5 kN for 500 mm and 600 mm piles.

4.3.1.4 *Casing*

These shall be made from 16 mm thick plates and the standard length shall be 1.5 m. The casings shall be threaded on both sides and suitable collar shall be used to protect the threads.

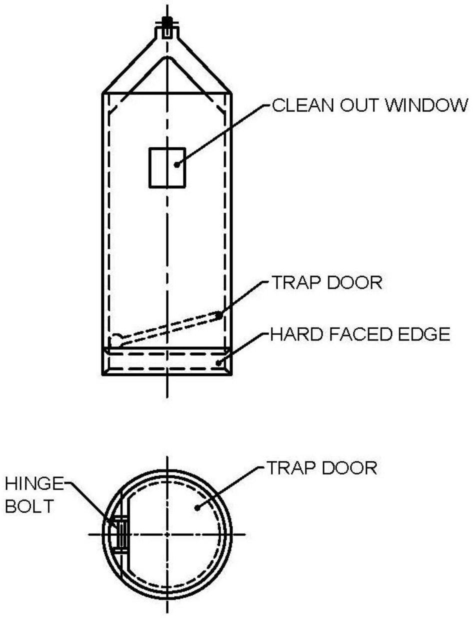

FIG. 2 SLUDGE PUMP

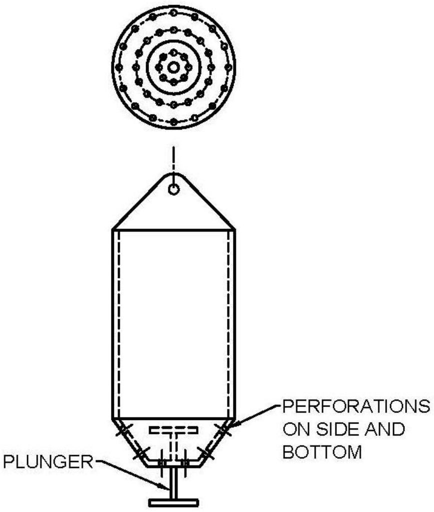

FIG. 3 BAILER

4.3.1.5 *Casing extractor plate*

A steel plate of suitable size [*see* Fig. 5(a)] shall be used for the extraction of casing, after the boring operation is complete.

4.3.1.6 *Casing extractor bar*

This shall be a round bar [*see* Fig 5(b)] of about 75 mm diameter. It shall be passed through the holes on sides of the casing and through the extractor plate, to enable extraction of casing.

4.3.1.7 *Casing drive bar*

This bar shall have a cross-section of at least 75 mm and shall be used to drive the casing.

4.3.1.8 *Tiller*

This gadget (*see* Fig. 6) shall be used to rotate the casing manually, whenever necessary.

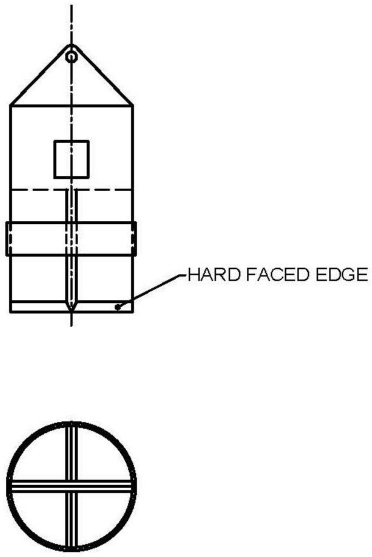

FIG. 4 CHISEL

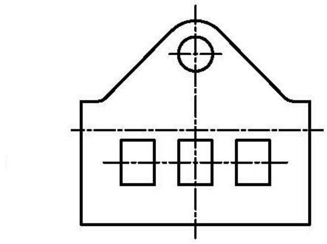

FIG. 5A CASING EXTRACTOR PLATE

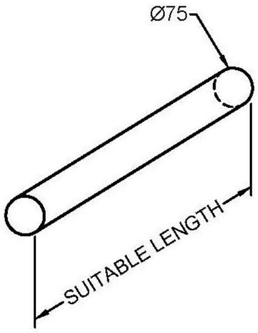

FIG. 5B EXTRACTOR BAR

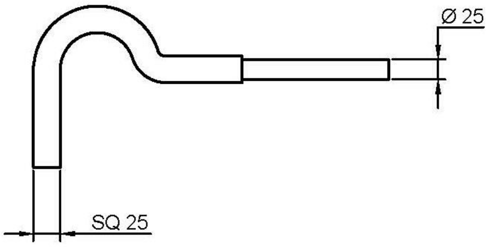

FIG. 6 TILLER

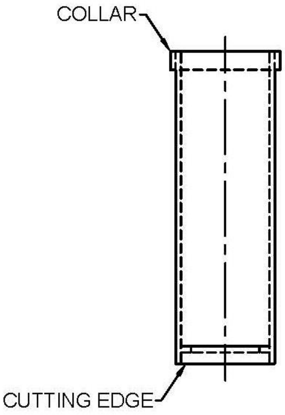

FIG. 7 TEMPORARY CASING

4.4 Temporary Casing

This shall consist of the following parts (*see* Fig. 7).

4.4.1 The casing collar shall be attached at the casing top to take the blows during casing driving.

4.4.2 The main casing shall be made from 16 mm thick steel and shall be threaded at one end.

4.4.3 The casing shall be provided with a cutting edge at the bottom to facilitate driving.

4.5 Tremie Arrangements

The tremie arrangements shall include the following:

a) Concrete hopper;
b) Hopper plug;
c) Tremie pipe;
d) Holding clamp; and
e) Hoisting plug.

4.6 Accessories

Accessories shall include the following:

a) Concrete placer;
b) Wheel barrow;
c) Measuring chain;
d) Bailers;
e) Crowbars;
f) Dog-clamps with pins;
g) Steel measuring tape; and
h) Mucking shovel.

5 MARKING

5.1 Rating Plate

Each pile-boring equipment shall have a rating plate firmly attached to some part which will not be easily removable. The plate shall have clearly marked on it the following information:

a) Manufacturer’s name and address;
b) Month and year of manufacture;
c) Machine name and model number; and
d) Standard capacity of the winch drum.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this Standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Construction Plant and Machinery Sectional Committee, MED 18

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In Personal Capacity (*D-24, Amar Colony, New Delhi*)	SHRI SATANDER KUMAR
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Member Secretary
SHRI LOKRAJ MEENA
SCIENTIST 'B'/ASSISTANT DIRECTOR
(MECHANICAL ENGINEERING), BIS

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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